Chapter 7

Language After Traumatic Brain Injury
A traumatic brain injury occurs when an outside force impacts the head hard enough to cause the brain to move within the skull or if the force causes the skull to break and directly hurts the brain.

* A direct blow to the head can be great enough to injure the brain inside the skull. A direct force to the head can also break the skull and directly hurt the brain. This type of injury can occur from motor vehicle crashes, firearms, falls, sports, and physical violence, such as hitting or striking with an object.

* A rapid acceleration and deceleration of the head can force the brain to move back and forth across the inside of the skull. The stress from the rapid movements pulls apart nerve fibers and causes damage to brain tissue. This type of injury often occurs as a result of motor vehicle crashes.
* Every 23 seconds, one person in the U.S. sustains a TBI
* An estimated 5.3 million Americans - a little more than 2% of the U.S. population - currently live with disabilities resulting from TBI
* 1.4 Million Americans sustain a Traumatic Brain Injury each year:
  o 50,000 deaths
  o 235,000 hospitalizations
  o 1,111,000 emergency department visits

Etiology

Causes of Brain Injury

- Falls
- Recreation
- Shaken Infant Syndrome
- Violence
- Motor Vehicle Violence
- Bicycles
- Motor Vehicle

http://www.bianys.org/What_BI/What_BI.html
The Leading Cause of TBI Hospitalization

* Motor Vehicles:
  - Motor vehicle crashes represent 62% of all transportation-related TBIs, and are the leading cause of death for 15- to 20-year-olds.

* Bicycles:
  - About 130,000 children under 15 years old sustain a TBI each year, and 200 of them die.
  - Universal helmet use could prevent one death every day and one brain injury every 4 minutes.

* Motorcycles:
  - Brain injury is the leading cause of death in motorcycle crashes.
  - According to NHTSA, motorcycle helmets are 67% effective in preventing brain injuries.

* Scooters/Skateboards:
  - In the year 2000, there were almost 40,000 emergency room treated injuries associated with scooters.
  - Proper use of helmets, knee pads and elbow pads could reduce these injuries by 85%
Traumatic Brain Injury

- #1 cause of death in children
- Approx. 200 per 100,000 people

#1 cause of death in children
  - Car and bicycle accidents
  - Child abuse
  - Falls
  - Gunshot wounds

Approx. 200 per 100,000 people
  - Half results in death
  - Half results in varying degrees of disabilities (including aphasia)
Traumatic Brain Injury (cont.)

Traumatically induced physiological disruption of brain function (manifested by at least one of the following)

1. Loss of consciousness
2. Loss of memory for events immediately before or after the accident
3. Alteration in mental state at time of accident (dazed, disoriented, confused)
4. Focal neurological deficits that may or may not be transient but extent of injury does not exceed
   Loss of consciousness for 30 minutes
   After 30 minutes, Glasgow Coma Scale of 13
   24 hours of post-traumatic amnesia
Traumatic Brain Injury (cont.)

- Categories of symptoms
  - Physical symptoms
  - Cognitive deficits
  - Behavioral changes

Physical symptoms
- Dizziness, headaches, nausea, vomiting
- Blurred vision and sleep disturbances may occur
- Unexplained lethargy, quickness to fatigue

Cognitive deficits
- Poor attention skills, difficulty in concentrating, perceptual memory deficits, speech-language problems
- Must determine that other causes not present

Behavioral changes
- Emotional lability, disinhibition, irritability, quickness to anger
- Must exist in absence of other psychological, physical or emotional stresses
Types of Injury

- Closed head injury - meninges intact
- Penetrating head injury - meninges torn
- Coup injury - point of impact
- Contrecoup - opposite point of impact
- Focal lesion - limited to small area
- Diffuse lesion - widespread damage
Nelson’s Etiological Categories

1. Focal acquired lesions
   - Frequently caused by strokes in children
     - Embolisms (air bubbles) associated with congenital heart disease
     - Vascular disorders due to sickle cell anemia
     - Left hemisphere - usually fairly complete recovery
     - ? Long term language and learning difficulties

2. Diffuse lesions with associated TBI
   - Fairly good language recovery but long term problems with linguistic processing and cognition

3. Acquired childhood aphasia secondary to convulsive disorder
   - Often includes unknown etiological factors
   - Landau-Kleffner syndrome
     - Severe language comprehension deficits

4. Other kinds of brain injury or encephalopathy
   - Tumors, encephalitis, meningitis, cancer treatment
   - Extent varies depending on:
     - Extent and location of damage
     - Age
     - General health
Underlying Complications

- Exact outcome unknown
- Seizures
- Swelling
- Hypoxia
- Hemorrhage
- Blood clots
Effect of TBI

- Gross and Fine Motor
- Cognitive
- Perceptual Motor
- Behavioral
- Social
Gross and Fine Motor

- Severe TBI
  - Spasticity
  - delayed motor milestones,

- Mild
  - fine and visual motor deficits
  - reduction in age appropriate play and physical activity
Cognitive

- long and short term memory problems, conceptual skills, problem solving,
- reduced speed of information processing,
- reduced attending skills
Perceptual Motor

- visual neglect, visual field cuts,
- motor apraxia, reduced motor speed, poor motor sequencing

http://www.cf.ac.uk/psych/home/halliganpw/pubs/images.html
Behavioral

- impulsivity, poor judgment, disinhibition, dependency, anger outbursts, denial, depression, emotional lability, apathy, lethargy, poor motivation

http://www.lynwodemanor.co.uk/anger-management.html
Social

- does not learn from peers, does not generalize from social situations,
- behaves like a much younger child, withdraws,
- becomes distracted in noisy surroundings and becomes lost even in familiar surroundings

Effects of CHI & TBI

1. Initial effects
   - Coma
     - Severity
     - Glasgow Coma Scale (Table 7-2, p. 169)
     - Retrograde amnesia
     - Abnormal behaviors - irritability, aggression, hyperactivity
     - Motor dysfunctions - rigidity, tremor, spasticity, apraxia

Severity
   - Mild - loss of consciousness of less than 30 minutes and posttraumatic amnesia lasts less than 1 hour
   - Moderate - more than 30 minutes with PTA less than 24 hours
   - Severe - coma more than 6 hours and PTA from 1 to 7 days
   - Very severe - PTA more than 7 days

Glasgow Coma Scale (Table 7-2, p. 169)
   - Developed for adults so should be used cautiously

Retrograde amnesia
Abnormal behaviors - irritability, aggression, hyperactivity
Motor dysfunctions - rigidity, tremor, spasticity, apraxia
Effects (cont.)

2. Acute Recovery Period
   - Production deficits
   - Comprehension and word finding difficulties
   - Syntactic problems
   - Written deficits

3. Long-term (residual) effects

Production deficits
   - Consonants
   - Possible mutism

Comprehension and word finding difficulties

Syntactic problems
   - Limited MLU
   - Difficulty constructing sentences
   - Fewer utterances

Written deficits

3. Long-term (residual) effects
   - Persistent word retrieval problems
   - Reduction in spontaneous speech
   - Reduced fluency
   - Pragmatic problems
   - Poor academic performance (math, reading, reasoning)
   - Memory problems
   - Behavior (hyperactivity, impulsivity)
   - Residual confusion
Thinking Problems

- Has trouble remembering things
- Has trouble paying attention
- Reacts or thinks slowly
- Takes things too literally, doesn’t understand jokes
- Consistently thinks about the same things
- Trouble learning new things
- Trouble making decisions
- Has trouble with a task: planning, starting, doing, finishing
- Has trouble remembering to do things on time
- Makes poor decisions or has lost common sense

http://www.bianys.org/What_BI/other_problems.html
Communication Problems

- Changes the subject consistently, has trouble staying on one topic
- Has trouble thinking of the right word
- Has trouble listening
- Doesn't speak clearly
- Has trouble reading
- Talks excessively

http://www.bianys.org/What_BI/other_problems.html
Language Deficits

- Concentration
- Sustained attention
- Memory
- Nonverbal problem solving
- Part or whole analysis and synthesis
- Conceptual organization and abstraction
- Processing
- Reasoning
- Executive functioning (formulating goals, planning to achieve goals carrying out plans)
Pediatric Aphasia

Pediatric -

- Usually nonfluent with mutism, effortful speech, impaired repetition skills
- Less likely to show paraphasia, jargon, and fluent aphasia
- Anomia -
  - Figurative and abstract language difficulties
Assessment Areas - Team

- Mood & behavior changes
- Cognitive abilities
- Language abilities
- Memory and learning
- Verbal vs. nonverbal intelligence, general knowledge
- Executive functioning
- Academics and achievement
- Abstract reasoning and concept formation (problem solving, and judgment)
- Fine motor control and speed (strength, coordination and dexterity)
- Sensory and perceptual skills (orientation in space and time, and visual and tactile perceptual abilities)
- Personality inventory and psychosocial factors

Multidisciplinary team

Mood & behavior changes
  injury or reaction?
Cognitive abilities
  auditory and visual processing
  Attention
Language abilities
  Comprehension of words and sentences
  Auditory discrimination
  Expressive abilities
Memory and learning
Verbal vs. nonverbal intelligence, general knowledge
Executive functioning
  formulating goals, planning to achieve goals carrying out plans
Academics and achievement
  Subject specific testing (math, vocabulary, reading, spelling)
Abstract reasoning and concept formation (problem solving, and judgment)
Fine motor control and speed (strength, coordination and dexterity)
Sensory and perceptual skills (orientation in space and time, and visual and tactile perceptual abilities)
Personality inventory and psychosocial factors
Treatment

- Team approach including family
- Age important due to plasticity of brain
- Environmental enrichment is key (computer)
- Brief & frequent sessions (4-15 minute better than 1-60 minute session per day)
- Functional communication goals
- General compensatory strategies